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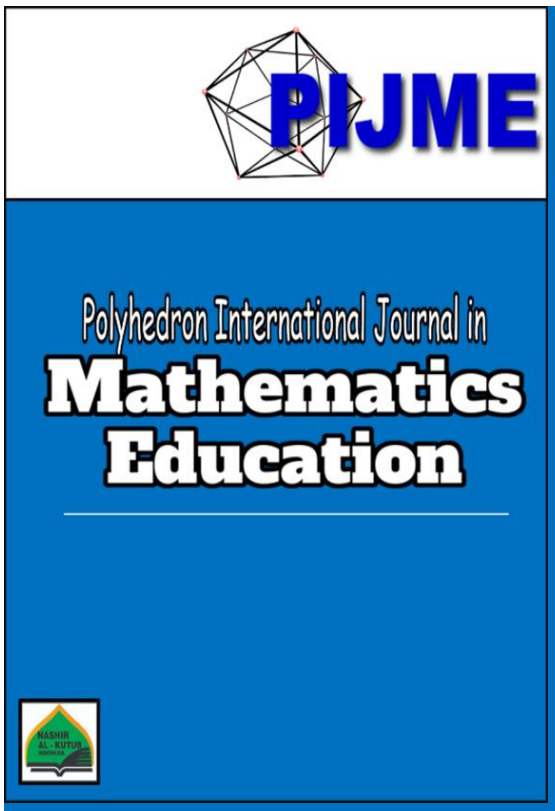

The influence of regional languages on presenting and solving local mathematics problems: a literature systematic review

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Original Article

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Abstract
This research aimed to find out how the use of regional languages influenced the presentation and solving of mathematical problems. In conducting the research, the researchers used the SLR (Systematic Literature Review) research method. They searched journals on several websites with predetermined keywords. To make it easier to filter articles to be researched, the researchers used the PRISMA flow, which involved several stages: identification, screening, eligibility, inclusion, and exclusion criteria. In the final stage, 21 articles were obtained for research. The research results showed that the use of regional languages in mathematics learning had a positive influence on students' attitudes and motivation in learning mathematics. Additionally, there was an increase in students' understanding of mathematical concepts, making it easier for them to solve local mathematics problems.

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1. Introduction

One of the important foundations of science in the field of education is the subject of mathematics which is taught from an early age to college. All generations definitely need mathematics without being limited by age. Through mathematics, humans can develop logical, analytical, systematic, critical and creative thinking skills, as well as cooperative abilities that are applied in everyday life (Martin & Bernard, 2019:45). However, in the mathematics teaching and learning process there are several obstacles and barriers. For example, students have difficulty understanding mathematical concepts, have difficulty understanding mathematical symbolism, students also have difficulty interacting with teachers so that they do not get effective guidance and their lack of motivation to learn mathematics. Of the several problems faced by these students, there are also other factors that cause difficulties for these students, namely teachers who use language that is not in accordance with the students' language habits (Rahmadani et al., 2023). Students use regional languages everyday, but teachers use Indonesian. You can imagine that the teaching and learning process will be difficult because of the differences in the languages used, especially for some students who are not yet fluent in using Indonesian.

Based on this description, researchers are interested in studying the influence of the use of regional languages on the presentation and solving of mathematical problems. The research method used in this research is systematic literature review (SLR). This method is used to make

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it easier for researchers to understand the topics that will be discussed and of course from sources that have been tested. Research on the influence of regional languages on the presentation and understanding of mathematical concepts has also been carried out by several other researchers.

Based on previous research, it has been revealed that students still need to use their mother tongue in the learning process. The mother tongue is used as a tool to understand the meaning and purpose of the subject matter in depth. This is necessary because some students are still influenced by their mother tongue, which in this case is Javanese (Bhakti, 2020). The use of the mother tongue in mathematics learning generally increases students' learning motivation, because students understand the material more easily and quickly when using their mother tongue which they consider easier to understand (Syaprizal, 2019). This applies especially in Mathematics learning, where students tend to grasp difficult concepts more quickly when using their mother tongue in the classroom. Mathematics is often considered an abstract science, which involves organizing patterns, and systematic, critical, logical and consistent thinking. Because of its abstract nature, Mathematics is often a subject that is considered difficult by some students (Masjudin, 2017). In line with previous research, Mahmud (2018) explains that various factors influence the use of mother tongue in the learning process, including environmental factors. This environment includes the school environment, community, and even the family environment. School environmental factors, which have a major impact on learning outcomes, are mainly related to the use of the language of instruction in learning. The language of instruction is defined as the language used in communication during negotiations, giving lessons at school, and similar situations (Syaprizal, 2019).

Based on this description, the researcher intends to examine the influence of using regional languages in presenting and solving local mathematical problems. This research aims to find out how students react or understand mathematics problems using local language. Apart from that, researchers also want to know whether using local language and local problems can make students interested in learning mathematics. So, to achieve the research objectives, several research questions were prepared. Some of the research questions include:

1.1. What research methods are used?
1.2. How does the use of regional languages influence students' attitudes and motivation in learning mathematics?
1.3. How does regional language affect students' ability to apply mathematical concepts to solve problems?

2. Method

The method used in this research is systematic literature review (SLR). SLR was chosen because it uses a systematic and structured method for searching, analyzing and synthesizing information from the sources obtained. In addition, SLR can be an effective tool in improving the quality of information and increasing the credibility of research and can increase understanding of research topics because it provides a comprehensive and detailed picture of themes and related issues (Kosanke, 2019). This makes it easier for researchers to understand the influence of regional languages on the presentation and solving of mathematical problems. To make it easier to achieve research objectives and the process of reviewing articles, this research uses the PRISMA approach or flow. PRISMA is used because it can help researchers to produce systematic, transparent, accurate, safe, high quality and accountable reports (Rosari & Dewi, 2022).

There are several PRISMA steps used in this research, namely identification, screening, eligibility, inclusion and exclusion criteria. At the identification stage, researchers used the keywords "Regional Language, Ethnomathematics, Mathematics and Motivation" to search

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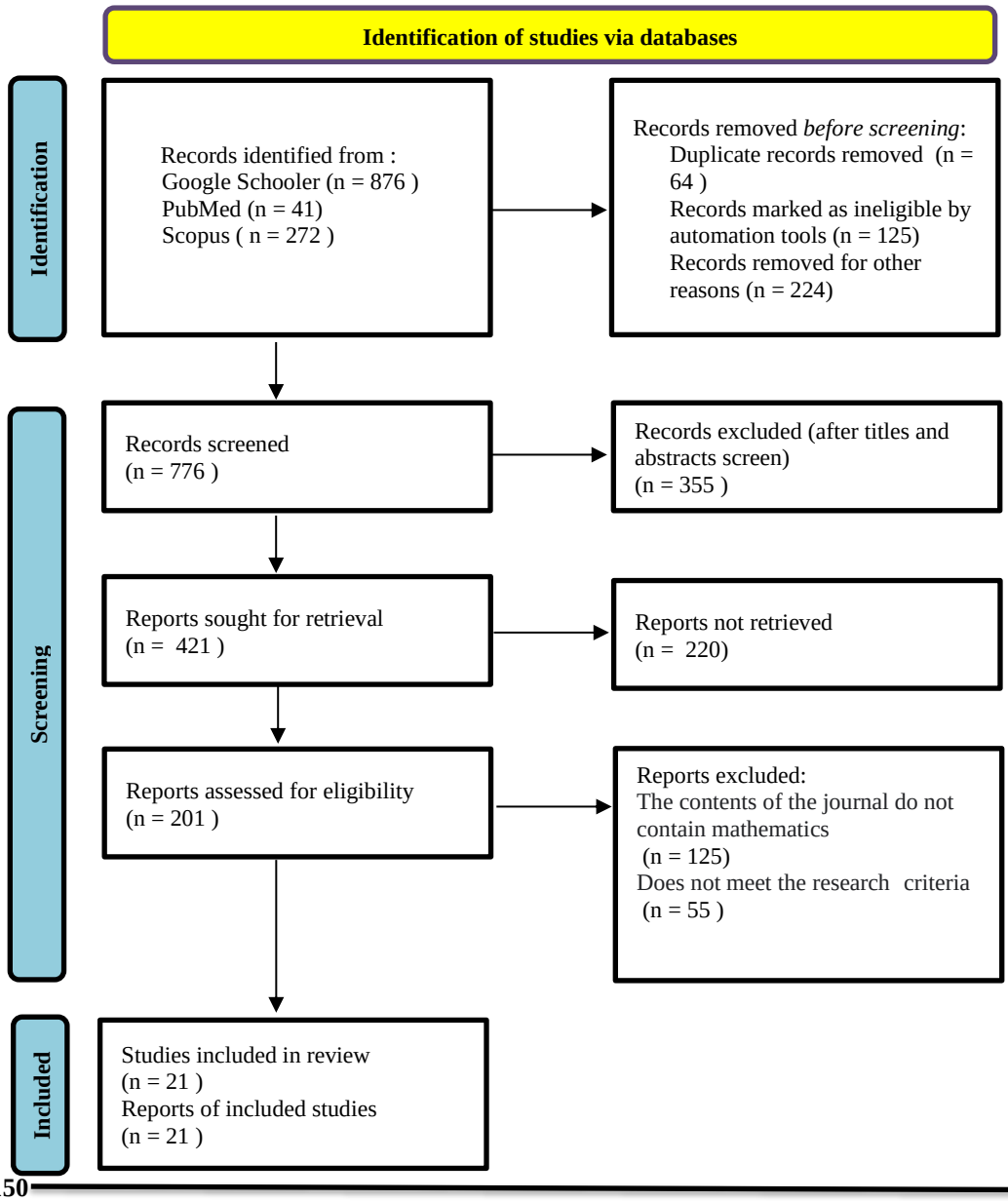
several websites. The websites used are PubMed, Scopus, and Google Scholar. PubMed obtained 41 articles, Scopus obtained 272 articles, and Google Scholar obtained 876 articles. The total number of articles at this stage is 1,189 articles. At this stage, the title and abstract are also identified. There were 64 similar journal articles and 349 journals whose text was identified as incomplete. So at this stage there are 776 journal articles remaining. The next step is the Screening Stage. where, at this stage the journal articles are filtered based on their suitability to the research criteria. The research criteria in question are journals containing mathematics. Of the 776 articles, 575 articles were obtained that did not meet the research criteria and 201 articles remained at this stage. The next stage is eligibility, at this stage selection is carried out on research methods and results. As many as 180 journal articles were rejected because they did not explain in detail the influence of regional languages in mathematics learning. The final stage is inclusion and exclusion, at this stage there are 21 remaining articles that will be reviewed and researched. The article selection process at this stage is articles that are relevant to the research criteria, full-text, have been published, and can answer the research objectives and questions. For more details, look at Figure 1.

Figure 1
PRISMA flow diagram



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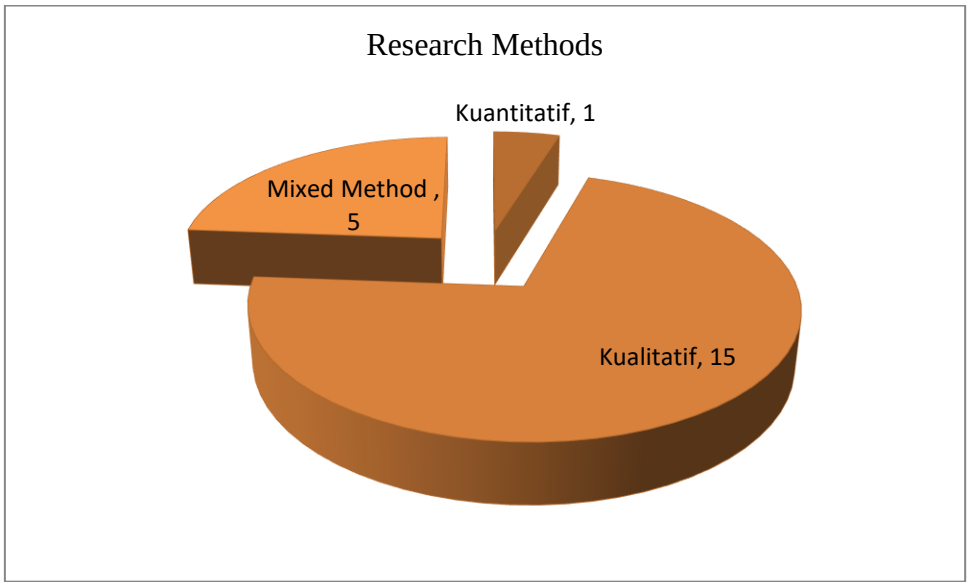
3. Results and Discussion

After reviewing the 21 journal articles obtained, we found the answers to our research questions, which are as follows.

3.1. What research methods are used?

Of the 21 journals studied, 15 journals used qualitative research methods, 1 journal used quantitative methods, and 5 journals used mixed methods. An illustration of the use of these three methods can be seen in Figure 2.

Figure 2
Illustration Research method for using regional languages in mathematics learning



From the analysis carried out, most of the research methods used in studies examining the influence of regional languages in presenting and solving mathematical problems are qualitative. This is primarily due to the fact that regional languages are often closely linked to specific cultural, social, and historical contexts. Qualitative methods enable researchers to consider these contextual factors and explore how they influence both the use and impact of regional languages (Mahendra et al., 2022). By allowing for a more nuanced understanding of the relationship between language and context, qualitative research methods are especially useful in uncovering the subtleties of language use that might be overlooked in a purely quantitative study.

Moreover, the limited availability of quantitative data on regional languages makes qualitative methods a more practical choice for examining their influence (Faradinda et al., 2023). Quantitative approaches often struggle to capture the complex dynamics involved in language use within different cultural contexts. Therefore, qualitative research not only provides richer insights into these dynamics but also facilitates an inductive approach that helps researchers understand the realities of regional language use more thoroughly (Sutrisno et al., 2023). Through this approach, researchers can build a deeper understanding of how regional languages shape the learning process in mathematics, ultimately providing valuable insights into the role of language in education.

3.2. How does the use of regional languages influence students' attitudes and motivation in learning mathematics?

After analyzing 21 journals, 17 articles found that there was a change in students' attitudes when teachers presented mathematics lessons using their mother tongue and 14 articles revealed an increase in students' motivation in learning mathematics. For more details, see Figure 3.

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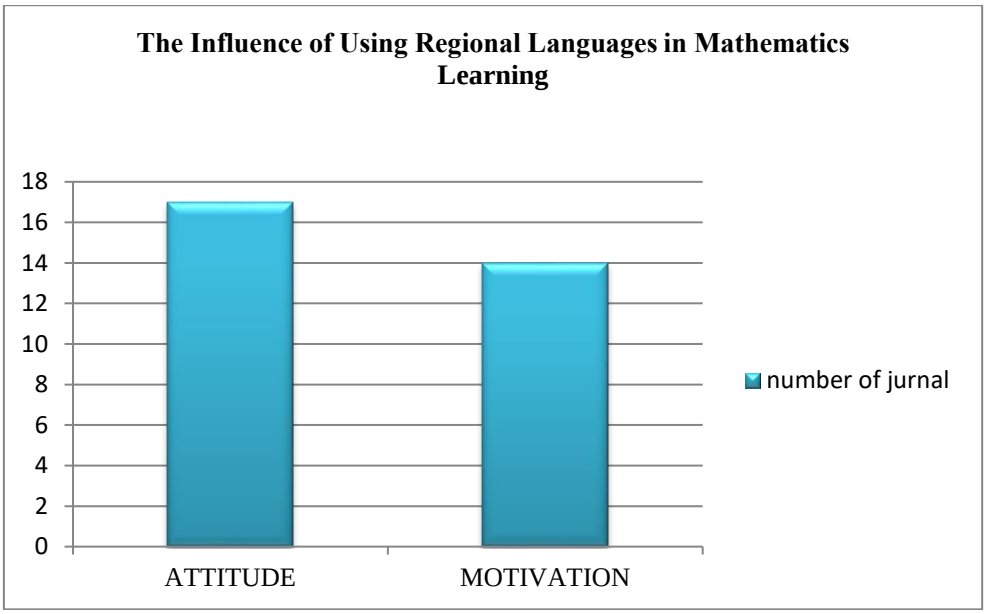
Figure 3
The influence of regional languages on student attitudes and motivation



The use of mother tongue in learning has an impact on changes in students' attitudes towards learning, this can be seen from students becoming more open and confident when teachers convey mathematical concepts using regional languages (Sutrisno et al., 2023). When teachers provide explanations, ask questions, or give questions, students respond quickly and the use of their mother tongue in learning shows an increase in student learning outcomes (Daryanto, 2010). This is in line with research conducted by Puspitasari and Devi (2019) that the use of mother tongue can contribute to improving student learning outcomes, because they understand mathematics material more easily and quickly. The use of mother tongue in learning makes students more familiar in communicating with their teachers so that there is a reciprocal relationship during the learning process (Agasi & Wahyuono, n.d.). When mathematics is considered part of the culture, they feel more confident in their abilities and have a sense of ownership of the learning they do. This can be seen from their increased involvement in learning.

The findings also show that the use of mother (regional) languages combined with learning media can help school students learn more easily using regional languages, as well as increase student motivation and learning outcomes (Ayu et al., 2019). This is in line with research conducted by Suhardin (2017) that students' learning motivation is quite high by using their mother tongue in mathematics learning. This can be seen from the results of the analysis of student learning motivation which showed that experimental students' motivation was 45.8% higher than the control class (38.7%). This increase in motivation in learning mathematics is because students quickly grasp and understand the learning material when presented in their mother tongue. This is because their mother tongue is a natural language that they learn from their environment and family (Suttrisno et al., 2023).

3.3. How does the use of the local language affect students' ability to solve local math problems?

From the analysis carried out on the journal articles obtained, the use of regional languages in learning can improve students' abilities in solving mathematical problems (Rahmadani et al., 2023). This is influenced by the fact that they understand vocabulary better in their mother tongue and mathematical problems that are connected to their daily lives (Rosari & Dewi, 2022). For more details, look at Figure 4.

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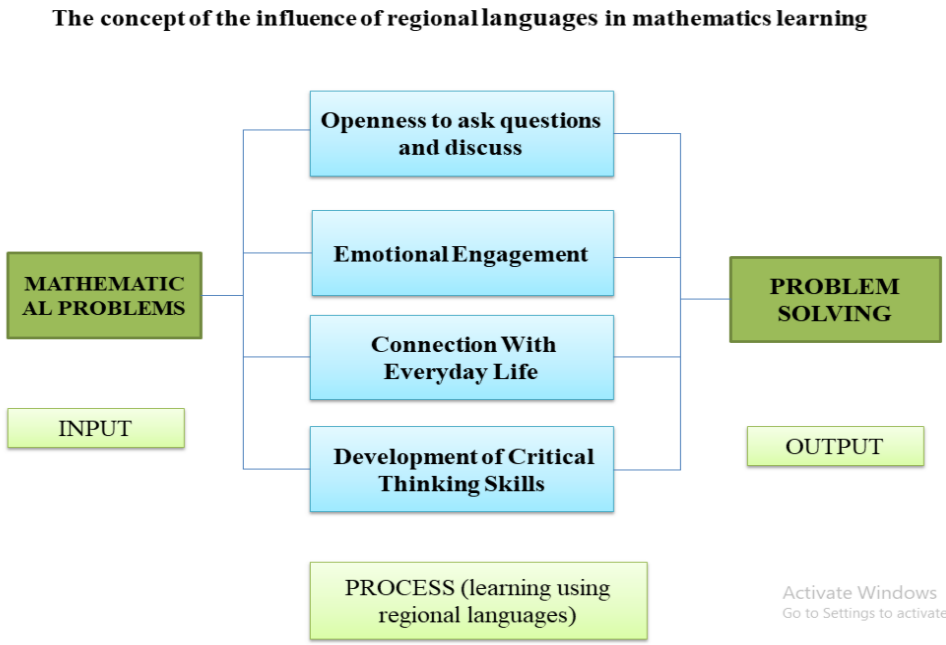
Figure 4
Illustration of the concept of the influence of regional languages on mathematical problem-solving abilities



Based on Figure 4., When students are faced with mathematical problems, the use of regional languages in learning results in them being open and feeling comfortable regarding these mathematical problems, thus building an inclusive, supportive teaching and learning process, and students feel valued and encouraged to express their thoughts more fully. free (Putri Wulandari et al., 2024). The use of mother tongue also reaches more into students' emotional aspects because it activates associations with the surrounding social and cultural environment, this helps them to be more connected to the problems given and understand the concept of problem solving more quickly (Yasiroh & Susilowati, 2024).

The use of regional languages often reflects activities in the surrounding environment, objects and situations that usually occur in students' daily lives (Rahmadani et al., 2023). So, when students are faced with these mathematical problems, it becomes easier for them to understand the relevance and solutions to the problems given. In research conducted by (Putra & Indriani, 2017), the use of mother tongue in solving local mathematical problems was able to stimulate the development of students' critical thinking skills about how to connect mathematical concepts with the reality that exists in the environment around them. Students look for varied ways to find solutions to the problems given, this is because they already understand and imagine the problems given (realistic thinking), of course this is very useful in developing an understanding of the mathematical concepts given.

4. Conclusion

Based on the results of research and discussion, several findings were obtained. First, the research methods used in research on the influence of the use of regional languages on the presentation and resolution of local mathematics problems mostly use qualitative research methods, namely 15 articles, while quantitative methods consist of 1 article and mixed methods consist of 5 articles. Second, of the 21 articles studied, 17 articles revealed that the use of regional languages in mathematics learning had a positive effect on changes in students' attitudes. Students are more confident in expressing their thoughts and reciprocal relationships are created in the mathematics teaching and learning process. In addition, 14 articles showed an increase in student motivation in learning mathematics. Third, by utilizing regional languages in mathematics learning, students can more easily understand the mathematical problems given, thereby increasing their ability to find solutions to these mathematical problems. Weaknesses in our research were that there were few websites that we used to look for references and we only took articles in Indonesian. In the future, it is hoped that more websites will be used for research on the

influence of regional languages on learning and it would be better to look for references from international journal articles so that the research carried out is more accurate and of better quality.

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Declarations
Author contributions: Author 1: wrote, looked for references, and prepared research questions; Writer 2: Write and look for references about research methods; Author 3: Provide input on research and review and validation

Conflict of Interest:
The authors declare no conflict of interest.

Additional Information
Additional information is available for this paper.

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